

**Pest Management Program for Grape Series****INSECT & DISEASE IDENTIFICATION GUIDE FOR GRAPES**

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INTRODUCTION

Early recognition of disease and insect problems in the vineyard is important for the prevention of heavy infestations and serious crop losses. While some diseases and insects may be present every year, seasonal fluctuations in disease severity and insect populations may cause a disease or insect to be a major problem one year and not the next. As a result the pest complex and the control measures may vary each year. To aid in the management decisions for pest problems, the Disease and Insect Monitoring Guideline contained within this factsheet has been produced to give an overview of activity of the grape pest complex. This factsheet describes the major and minor pests most frequently found on grapes in the Niagara Peninsula region and should be used in conjunction with the pictorial factsheets *Diseases of Grape in Ontario* and *Insect Pests of Grape in Ontario*. The information may aid growers and advisory personnel in identifying disease or insect problems early and control measures can be implemented before serious problems arise.

How to Use the Disease and Insect Monitoring Guideline for Grapes

Locate the time of year or the growth stage at the top of the Disease and Insect Monitoring Guideline for Grapes (Table 1). Look down vertically from the time of year or growth stage reference. Any intersection of the imaginary vertical line with a horizontal line indicates that the disease or insect **may** be present at that time. For example, during the first week of June (time of year) or during the prebloom period (grape growth stage) the following diseases may be present: Downy Mildew, Black Rot, Phomopsis and Eutypa Dieback. Similarly, the following insects may be referenced: Grape Berry Moth, Spring Feeding Caterpillar Complex, Blossom Midge and Tumid Gall. A vertical line drawn with a ruler may be useful in this identification step. Once the possible diseases and insects have been identified, refer to the Disease Information Table (Table 2) and the Insect Information Table (Table 3) to obtain the symptoms

of disease infection and insect damage for those pests specified in the guideline. The information tables are aids in matching the symptoms found in the vineyard to those of a specific disease or insect. In a situation where the field symptoms do not match those listed in the table, consultation with a grape advisor or with another information source is necessary for a positive identification. Use the control measures and references section of the information tables to aid in making spray decisions.

CONTROL

Good management of disease and insect problems involves both cultural and chemical applications. Spring cultivation is a good cultural practice that buries any debris which may carry overwintering disease and/or insects and may reduce the initial population for that season. For both disease and insect control, proper pruning is necessary to allow good spray coverage and, in the case of disease, control, good air movement for rapid drying of foliage. In addition to these cultural practices, regular scouting throughout the vineyard during the growing season is recommended for monitoring changes in pest activity. For the chemical control of pests, consult OMAF Publication 360, *Fruit Production Recommendations* for spray recommendations and spray materials. A variety of chemicals are registered for use on major pests, however, fewer and often none are registered for minor pests. When no chemicals are available, contact your local grape advisor for further suggestions on potential control tactics.

OTHER OMAF FACTSHEETS ON GRAPE PESTS

Insect Pests of Grape in Ontario, Agdex 212/632
Diseases of Grape in Ontario, Agdex 212/632
Grape Phylloxera, Agdex 251/612
Powdery Mildew of grape, Agdex 231/634
Botrytis Bunch rot of grapes, Agdex 231/634
Grape berry moth, Agdex 231/624
Phomopsis Cane and Leaf spot of grapes, Agdex 231/634
Downy Mildew of Grape, Agdex 231/634

TABLE 1 DISEASE AND INSECT MONITORING GUIDELINE FOR GRAPES

TIME OF YEAR		MONTH	MAY				JUNE				JULY				AUGUST				SEPTEMBER				OCTOBER			
			1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4				
GRAPE GROWTH STAGE		BUD BREAK		PRE-BLOOM		BLOOM		BERRY SET		CLUSTER TIGHTENING				HARVEST												
DISEASES																										
Major																										
Downy Mildew																										
Powdery Mildew																										
Berrytis																										
Minor																										
Black Rot																										
Phomopsis																										
Eutypa Dieback																										
INSECTS																										
Major																										
Grape Berry Moth																										
Minor																										
Spring Feeding Caterpillar Complex																										
Blossom Midge																										
Phylloxera																										
Grape Flea Beetle																										
European Red Mite																										
Erineum Mite																										
LEGEND		PEST MAY BE PRESENT KEY PERIOD FOR SYMPTOMS OR ACTIVITY																								

TABLE 2 DISEASE INFORMATION TABLE

DISEASE	DISEASE SYMPTOMS	FAVOURABLE CONDITIONS	CONTROL MEASURES
Downy Mildew	- on young green tissues (i.e. shoots, tendrils, leaves and clusters) small, pale yellow spots on the upper leaf surface with white, fuzzy spore masses directly below spots on the underside; later yellow spots turn brown and white sporulation becomes dark gray - severely infected clusters turn dark and curl to resemble a pig tail	- disease infection requires wet periods and cool to moderate temperatures - optimum 18-24 °C favours disease development	- prune to allow good air movement and spray penetration - cultivate in the spring to bury previous year's infected debris - protect new growth with effective fungicides
Powdery Mildew	- white to grayish, powdery spore growth is seen on upper leaf surface or on fruit clusters (especially on interior of cluster) - inside the upper canopy is the initial site of infection - black, pinhead-sized specks (fungus fruiting bodies) appear in late summer	- high relative humidity allows spore germination and disease spread - warm, non-rainy weather is ideal; prolonged humid conditions also favour growth	- prune to allow good air circulation and to reduce shading and humidity in the vineyard - spray with fungicide to prevent infection
Botrytis	- grayish or light brown spore growth; occurs on dead floral parts or on other dead tissue - red-brown lesions appear around veins or in a triangular V-shaped pattern at leaf edges - white grapes turn brown and rot while purple grapes turn reddish; berries may split and become covered with tan spores	- cool (18-23°C), humid or damp weather is necessary for disease initiation - grape varieties with tight clusters are very susceptible (berry squeeze or split makes wounds for infection)	- allow proper air movement for drying of vines - remove infected debris - prevent berry damage by pests (i.e. Grape Berry Moth) - use a preventative fungicide program
Black Rot	- upper leaf surface will have reddish-brown circular spots with dark brown borders and black dots (pycnidia) in spot centres - raised black lesions develop on cluster and leaf stems and on new shoots - berries develop a small white dot (1 mm wide) which becomes encircled by a reddish-brown ring - later berries dry and shrivel into a blue-black mummy with numerous pycnidia on skin surface	- extended wet periods are necessary for spore germination - often disease is most serious under prolonged cool, wet conditions around bloom and again in late August through harvest	- use protectant fungicides - remove infected debris - cultivate early in season to bury infected mummies and debris
Phomopsis	- along leaf veins yellow spots develop with dark centres which may fall out and give a "shot-hole" appearance - dark brown or black spots appear on lower portion of shoots and stems and may coalesce and lengthen to form a patch of diseased tissue (sometimes resembles razor blade nicks) - lesions with light brown centres result if lesions crack and heal - Phomopsis-infected fruit looks similar to Black Rot infected fruit	- wet grape vines for several days after bud break allow infection - cool weather favours fungus growth in early season while shoots are first elongating	- remove and destroy or bury diseased and dead wood from vines - apply protectant fungicides especially at 2-5 cm growth and 10-15 cm growth
Eutypa Dieback	- cupping of leaves along with stunting and chlorosis of shoots occurs during the first two months of the growing season - leaves show small necrotic spots and tattered edges - cankers are seen around old pruning wounds three to four years after initial infection - berries do not size uniformly	- pruning wounds in canes are entry points for the fungus - weakened canes and heavy rainfall will release spores	- prune canes below area of visible symptoms; renew vine with younger shoots that do not show symptoms - rogue out vine if infection has reached crown area of plant

TABLE 3 INSECT INFORMATION TABLE

INSECT	DAMAGE CAUSED BY INSECT	INSECT APPEARANCE	CONTROL MEASURES AND REFERENCES
Grape Berry Moth	• damage is caused by the larva (caterpillar) stage • first generation larvae web together buds, flowers and newly-set berries and chew them to shell or drop off • second generation larvae burrow into green berries near the berry stem or side where berries contact each other. A purple spot may form around the pin-head size hole. Berries may split, shrivel, become infected by disease, or fall off when damage	• adult moth is 6 mm when fully grown and has a brown body with wings that are gray-blue near the body and cream with brown spots near the tips • larvae have a cream body and dark brown head when hatched but become green and then purple with a light brown head when mature • larvae are 10 mm long at maturity	• remove wild grape host • bury leaf debris on vineyard floor • listen to spray timing guides on local agriphone reports • refer to O.M.A.F. factsheets on Grape Berry Moth
Spring Feeding Caterpillar Complex	• entire leaves or the interveinal areas of leaves are chewed and webbing may be present or absent on leaves • terminal leaves of shoots are webbed together and chewing damage is evident • damage is most severe along the peripheries of vineyards and in rows near bushes, woods or weedy areas	• Three caterpillars cause damage. 1. Eight Spotted Forester: 3.3 cm larva with orange, yellow, black and white stripes and black spots 2. Grape Plume Moth: 2 cm green larva with white hairs 3. Pyramidal Fruitworm 3 to 4 cm green larva with white specks, a whitish or yellow stripe down the back and a pyramid-like hump on its rear abdomen	• insecticides used for Grape Berry Moth are effective against these caterpillars
Blossom Midge	• flower buds are enlarged with a slightly reddish colour at the base of the flower bud • many small larvae (maggots) live in a watery fluid inside the bud and eat the internal flower parts • injury is more common in rows next to wooded or weedy areas	• larvae are yellowish to orangish in colour • adult fly identification is not confirmed	• no chemicals are registered • generally it does not cause economic injury
Phylloxera	• green or red fleshy galls, 6 to 20 mm in diameter, appear on undersurface of leaves and tendrils	• young adults are 1 mm long and yellow • nymphs are inside galls	• generally it does not cause economic injury • contact grape advisor
Grape Flea Beetle	• a few to many buds on a cane may be injured by the adult when it chews through the ends and sides of swelling buds • a circular hole is evident in the chewed buds and no shoots are produced • damage occurs in rows adjacent to bushes or wooded areas	• adult beetle is 5 mm long and has a dark metallic, greenish-blue or steel-blue colour	• apply insecticide
European Red Mite	• leaves become bronze-coloured due to adults and nymphs feeding on leaf underside; photosynthesis in leaves is reduced and berry ripening is affected	• adult female is less than 0.5 mm with a red to reddish-brown oval body and eight legs • adult male is dull green to brown with a pointed abdomen and is smaller than the female	• generally it does not cause economic injury • contact local OMAF grape advisor
Erineum Mite	• white, indented galls appear on the lower leaf surface and pink or reddish blisters develop directly above these galls; the galls later turn yellow and then reddish-brown • abnormal growth of new shoots, downward curling of leaves and premature leaf drop occur • in severe cases, terminal buds are destroyed and secondary shoots develop	• adults are whitish, wormlike and about 0.2 mm long • eggs are oval and white • large numbers of adults exist in colonies	• generally it does not cause economic injury • contact local OMAF grape advisor